SCIENCE NEWS-LETTER

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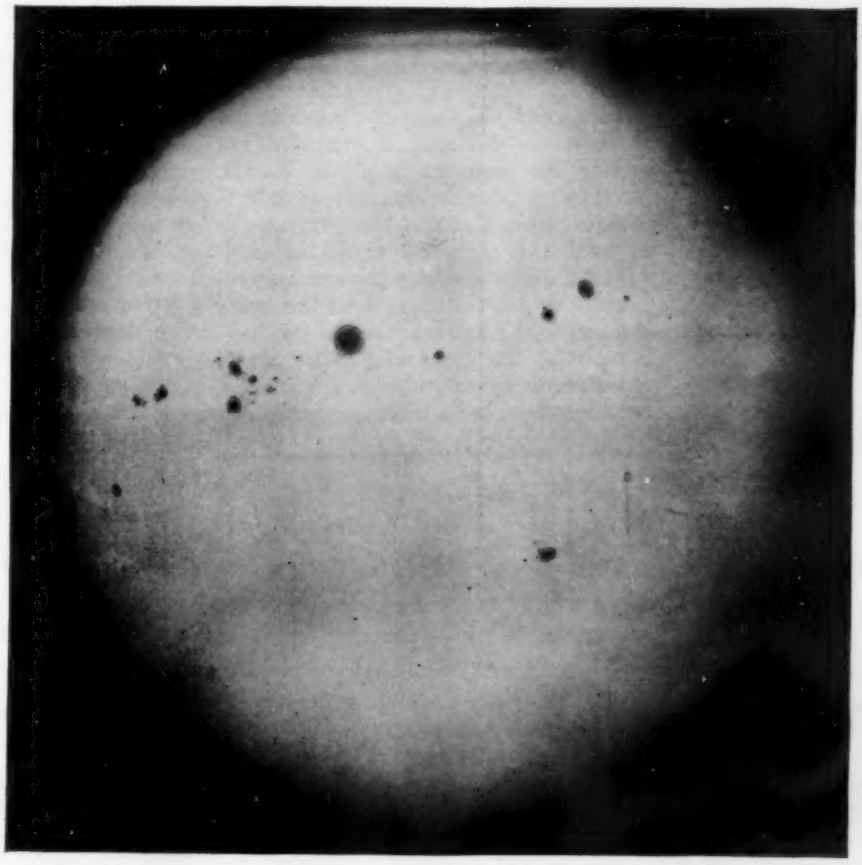

700,000 MILES OF SUNSPOTS

Recent Solar Activity May Indicate Maximum of Cycle

(See page 346)

Vol. XVI No. 452

700,000 Miles of Sunspots

Astronomy

Extending for 700,000 miles across the face of the sun, a string of spots that astronomers have recenly been observing shows unusual solar activity. They are shown in our cover illustration, a photograph made Friday, November 29, at the Yerkes Observatory by Charles D. Higgs. The photograph was made with the 40-inch telescope, largest in the world with a lens. The spots are in several groups, three of which could be seen with the unaided eye when properly protected with smoked glass or exposed photographic film. The largest single spot was 40,000 miles in diameter, with an "umbra," the dark inner portion, about 20,000 miles across. Several spheres the size of the earth, 8,000 miles in diameter, could be dropped into this spot. This large spot was on the sun's center line, as seen from the earth, Saturday, November 30.

The number of spots on the sun varies over a period of approximately eleven years. In the spring and summer of 1923 they were at a minimum. Then the numbers increased until a maximum was attained in July, 1928. Since then they have decreased in numbers, and many astronomers thought that they were definitely on the downward trend.

Last December, at the meeting of the American Astronomical Society in New York, Dr. Harlan T. Stetson, then of Harvard but now director of the Perkins Observatory at Ohio Wesleyan University, predicted still greater numbers this fall. He and Dr. Greenleaf W. Pickard, a radio engineer, have been studying the relation between sunspots and radio. Their work showed that there was a secondary cycle of about 15 months in which the spots varied. In January, 1926, there were many spots. Then they decreased, but by April, 1927, were still more numerous. They declined once more, but in July, 1928, there were even more.

"The quiescent period in the early part of 1929 followed by the extraordinarily great rise in solar activity this Fall has more than confirmed the late 1929 maximum I predicted," Dr. Stetson told Science Service "It now seems likely that this may prove the real maximum of the present sunspot cycle period. Measures of radio reception during the past few weeks bear out the correlation studies of Dr. Pickard and myself recently recorded.

"The year 1930 should see a general decrease in solar activity with a corresponding decrease in the ionization of the earth's atmosphere. This will favor the return of radio reception to normal conditions. During the subsidence period spasmodic outbreaks in the sun are to be expected at intervals, but with lessening intensity over the next 5 or 6 years."

Sunspots occur in the surface of the sun—the layer that astronomers call the photosphere. A mass of hot gases shoots up from the interior of the sun to the surface, rapidly revolving like a bullet in a rifle barrel. As they get to the surface, a whirlpool of gases results, the pressure is reduced and they are rapidly cooled. This sudden cooling causes a reduction in brilliance, and so the spots appear dark against the more brilliant solar background. They shoot out streams of tiny electrical particles, or electrons, which may reach the earth when the spot is on the right side of the sun. These electrons, acting in conjunction with the magnetic field of the earth itself, produce such effects as the northern lights, and the magnetic storms that may tie up telegraphic communication.

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Extinct Indians

Archæology

Along the Susquehanna River have been found village sites once occupied by the Conestoga Indians. Eighty-nine complete pottery vessels and many other everyday possessions of this extinct tribe have been unearthed by G. B. Fenstermaker of Lancaster, in cooperation with the Pennsylvania State Museum.

Capt. John Smith, who first encountered the Conestoga in 1608, described them as being warlike and far superior in physique to other neighboring tribes. Yet they were conquered by the Iroquois Indians in 1675, and less than a hundred years later the twenty warriors that were the only remnants of the once powerful tribe were massacred by white men near Columbia, Pa.

Growing interest in Pennsylvania's prehistory has lately aroused the state legislature to appropriate $20,000 to the Historical Commission for the purpose of conducting researches within the state.

An expedition along the Monongahela River has recently found evidence of two hitherto unknown Indian tribes. Representatives of one tribe were beetle-browed and had peculiar bits of excess enamel, resembling small pearls, in the roots of their teeth.

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It is found that airplanes are transporting on their tires some of the stickers, spines, and burrs of troublesome weeds.

The Field Museum has a collection of 52 ancient Egyptian tombstones including those of a king, priests, nobles, and ordinary citizens.

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Lindbergh Discovers Cliff-Dwelling

Archæology

In their flight over the home land of the prehistoric Pueblos, Col. and Mrs. Charles A. Lindbergh this summer discovered and visited ruins invisible from the ground and therefore probably never before examined by white explorers. Details of this airplane survey in the Southwest have just been announced by the Carnegie Institution of Washington, with which Col. Lindbergh has cooperated in his efforts to show the value of the airplane to American archæology.

It was while circling the ruins in the Canyon de Chelly that the fliers noted a number of small ruins in the side of the high cliffs. The plane was landed for the night on a flat place on the mesa near by, and next day the aviators climbed the cliffs and examined the ruins which could not be seen nor reached from the depths of the canyon below.

The airplane may be of great usefulness in the Southwest, the survey has shown. Col. Lindbergh's observations of ruins from the air demonstrated that practically all the ruins are clearly visible from above, and in some cases ruins can be better observed from the air than from the ground.

The airplane views of the Pueblo country obtained by the fliers show clearly the relation between the settlements of the ancient people and their surroundings. The water supply, land suitable for farming, and the question of defense against enemies all entered into the choice of a home by a Pueblo group. These features, which must be understood in order to explain the lives of these people, can be observed better from the air than in any other way.

ARROWS INDICATE THE CAVES containing cliff houses discovered by Col. and Mrs. Charles Lindbergh and visited by them

Photographs obtained by the Lindbergh survey also show what happens when a region is stripped of its top layer of plant life, as by overgrazing. When this occurs, heavy floods from the high mesas may sweep down without being held back by the plants. The result is that the land is stripped of its surface soil, roughened by gulleys, and in general is made arid and useless to the people who depend on it for a living.

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Finds Comet on Photo

Astronomy

Discovery of a new comet, not in the sky, but on a ten-day-old photographic plate that he was filing, was the recent experience of E. R. Carpenter, of the Seward Observatory of the University of Arizona. The photograph was made of the sky in the constellation of Aries, the ram, on November 2.

At the time the plate was exposed, the comet was not noticed. After Mr. Carpenter found its image on the plate, a further search was made for it in the sky, but the glare of the moon prevented its being seen. When discovered, it was very faint, of the 16th magnitude, and was moving to the southeast. However, it had a short tail, which is rather unusual for so faint a comet.

If two more observations are made of it, astronomers will be able to calculate its path.

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Art Protection May Aid Tropics

Mycology

Strenuous efforts to save five important paintings in Balboa from destruction by mold may, by chance, have the far-reaching result of showing how mildew can be effectively combatted in homes of the Canal Zone. A disadvantage of life in Panama has always been the mold which overnight attacks white shoes, linens, and other articles that offer nourishment to the ubiquitous spores of fungi. Dry closets have been the householders' chief protection against the enemy.

Attention of government chemists, an official of the British Museum, and other experts on molds was directed to the situation, when the disintegration of five mural paintings representing the construction of the Panama Canal was threatened by spreading green and white mold, which had apparently eaten even through to the canvas.

Prof. A. B. Newman, chemical engineer of the Cooper Union, finally solved the problem, with the cooperation of other experts, Mr. Van Ingen has reported. The varnish over the paintings was first removed. Then a liquid fungicide was applied to kill the deep-seated spores of the mold, and the dead fungi were washed away with ammonia. The final step was to spread a thin coat of paraffin containing thymol, a mold antiseptic, over the surface of the paintings.

"Our investigations have indicated that the question of mold can be handled as effectively as the mosquito menace," Mr. Van Ingen stated. "The method we used on paintings should work as well on shoes. It is not improbable that our experience with thymol will encourage the canal engineers to remove the ravages of mold."

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Scientists to Cross Worst Desert

Zoology-Geography

A motor caravan of scientists will soon attack the Kalahari desert, rated as the world's worst dry spot. Although not as extensive as the Sahara, it is more arid, and its borders are haunted by untamed native tribes hostile to all strangers. But the Vernay-Lang expedition of the Field Museum of Natural History expects to traverse it and to explore the neighboring lands along the Botletle River, the Chobe swamps and the British protectorate of Bechuanaland.

The plans for the expedition were announced by Stephen C. Simms, director of the Field Museum. Arthur S. Vernay, an experienced big-game hunter, will sail for England December 28. He will leave Southampton for Capetown on January 31. From there he will proceed to Francistown in the interior, where he will be joined by Herbert Lang, a former New Yorker, who has become one of the best known of South African explorers. At Francistown the personnel of the expedition will be assembled and the party will fare forth into the desert.

Their principal object will be to seek new and rare species of animals and birds, to add to the world's stock of zoological knowledge. Two of the known but scarce species sought are the giant sable antelope, one of the rarest of hoofed mammals, and the honey bird.

The honey bird is a creature of almost mythical behavior. African travelers state that when one of them sees a human being it whistles to attract attention, and then leads the way to a tree where wild bees have hived. It sits by while its human friends chop down the tree and take their fill of honey, and then proceeds to feast on the comb that is left, and especially on the young bee grubs.

After leaving the desert the party will pass through the country of the Barotse, one of the most interesting of African tribes. Among them spitting is not "bad form" but good religion, being the best method of warding off evil spirits. This tribe also shuns contact with undesirable denizens of the other world by decking their heads with hares' tails, ducks' feet and ostrich plumes.

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Gorillas, Like Men, All One Species

Zoology

Like their more successful and more widespread human cousins, the gorillas of equatorial Africa are all members of one species. Within the species they can be definitely differentiated into two zoological varieties, called for convenience the coast and the mountain varieties. Beyond this, all differences hitherto described can not be made out as anything more than local and probably fluctuating and impermanent.

These conclusions are set forth by a young Harvard zoologist, Harold Jefferson Coolidge, Jr., in a monograph on this interesting genus just off the Harvard University Press. Mr. Coolidge has made an exhaustive study of all available skeletal material on the gorilla and has examined all the scientific literature in existence bearing on the question of its zoological position.

The first scientific description of the gorilla was published in 1847 by Dr. Thomas Savage and Dr. Jeffries Wyman, who regarded the animal as a new species of orang-utan. Later, its claim to recognition as a different genus was advanced, and many zoologists proceeded to split it up into a considerable number of different species. Of recent years, however, the tendency has been to reduce the number of species, and now Mr. Coolidge gets it back down to one, with two distinct subspecies.

The two varieties, coast and mountain gorillas, live in ranges separated from each other by a considerable stretch of territory in which there are apparently no gorillas at all. Thus isolated and prevented from interbreeding, each group has developed and preserved certain peculiarities of its own, most notably in the proportions of the skull. The coast gorilla has a skull that averages a little longer and wider than that of the mountain variety, but the mountain gorilla has a larger jaw and ampler mouth cavity than his lowland brother possesses.

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The first synthetic perfume, "essence of mirbane" was discovered in 1834, but it was not put into use until 1850.

The U. S. Navy has discontinued its carrier pigeon message service and will use radio entirely.

Fight Infections

Surgery

Maggots, the tiny crawling larvae of blowflies, may prove to be of great value in preventing and checking wound infections. This new method of treating wounds which is now being investigated was developed from observations made during the World War by an American surgeon, Dr. William S. Baer, now clinical professor of orthopedic surgery at the Johns Hopkins University School of Medicine.

Dr. Baer noticed that when the wounded men had been lying out on the ground for some time before being brought to the dressing stations, their wounds were covered with tiny maggots, the larvae from which common flies develop. But these men, strangely enough, did not develop infections in their wounds, as did those whose wounds had been dressed and treated very soon after their infliction. The men who had been lying on the ground untreated the longest and who had the most maggots crawling on their wounds were the ones who did not develop any infections.

Further investigation of this unexpected state of affairs disclosed that the maggots were eating the dead tissues, bone and flesh, and thus destroying the material that would have furnished good breeding ground for bacteria. The bacteria which might have gotten into the wound and set up an infection were unable to exist in the wound which the maggots had cleaned up.

After the war Dr. Baer remembered the action of the maggots when he was treating children suffering from osteomyelitis. This disease is an inflammation of the bone, more common in children than in adults. It is the result of an infection and requires prompt surgical treatment. Recovery is often delayed for years if the disease reaches the chronic stage. In order to hasten the healing of the wound after operating on this condition, Dr. Baer has been using maggots with good results. The tiny creatures consumed all the dead tissue about the wound and the bacteria which had been causing the infection soon died from lack of sustenance.

The investigations along this line were abruptly halted during the first winter, when the cold weather killed the flies and so cut off the supply of maggots. Now, however, this contingency has ben provided for, and Dr. Baer has a plentiful all-year-round supply of the tiny creatures.

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He Showed Thousands the Stars

Astronomy—Biography

By James Stokley

Within a few years a huge eye, nearly seventeen feet in diameter, will search the skies from a California mountain. The 200-inch telescope of the California Institute of Technology, twice the diameter of the present largest telescope, has passed the stage of conversation. Thousands of hours of hard work will be required before success is achieved, but that work has already started.

Today a remarkable group of scientists are engaged in the preliminary stages of this work. Dr. George Ellery Hale, founder and first director of both the Yerkes Observatory and the Mt. Wilson Observatory, is the guiding spirit behind the project. Dr. John A. Anderson, Mt. Wilson astronomer and physicist, is in executive charge. And working with these two men are the other astronomers, physicists, opticians and engineers, whose individual contributions will all aid in bringing the project to a successful conclusion.

Most of these scientists, as one would expect, are men from great laboratories, observatories and other research institutions — men whose names have been widely known in scientific circles. But one of them is a man who was called to this work from a small Vermont town, a man whose specialty is versatility and who is able to advise on many phases of the work.

Russell W. Porter is this man. Despite his years of interest in astronomy, and the fact that his ability has received such high recognition, he still retains a becoming modesty. Though he went first to Pasadena last November, he is still hardly able to realize his good fortune.

"Do you know?" he said the other day, referring to Dr. Hale and his other colleagues, "I used to regard these men almost as gods, and now I am working with them!"

As a matter of fact, the circumstances under which he was called to Pasadena were most dramatic. He was working as optical associate with the Jones and Lamson Machine Co., in Springfield, of which his lifetime friend, Dr. James Hartness, former governor of Vermont, is president. Mr. Hartness has dubbed his colleague the "Leonardo of Springfield," so highly does he value his many talents.

RUSSELL W. PORTER, optician, artist, arctic explorer, engineer, telescope maker and fountain head of the amateur telescope making movement in the United States, shown with the Garden Telescope, one of many of his inventions to bring more people a sight of the stars.

On a beautiful autumn day last October, he yielded to the call of nature, and took his family on a picnic to a hill near Springfield, where they had their lunch around the campfire. Late in the afternoon he returned to his combination shop and laboratory to work on a spectroscope that he was making. On it was a brief note. It said tersely to report to Mr. Hartness, who was in his den. The Hartness "den" is an underground study, office, library, shop and rest room all combined, and is reached by a tunnel from the house. Attached to it also is an observatory, with a turret telescope, a type of which Mr. Hartness is the inventor.

So Porter repaired to the den, wondering what was up. When he reached there he found two strangers in conference with the "Governor." One was introduced to him as Dr. John A. Anderson, the other as Mr. Francis G. Pease. Both are eminent members of the staff of the Mt. Wilson Observatory. The former is the executive officer of the observatory council of the California Institute which is charged with the design and construction of the great new telescope, the second was chiefly responsible for the design of the mechanical parts of the observatory's 100-inch telescope, still the world's largest.

"We want you to come out to Pasadena and help in the design of the 200-inch telescope," Dr. Anderson told him. Probably no man ever received an offer with greater surprise. He had heard about the great telescope that was contemplated, of course. In fact, he knew that one style of mounting that had been favorably considered for it was one that he had suggested in an article in *Popular Astronomy* in 1919. But that he should be asked to take any part, however small, in its construction! Probably he would almost as soon have believed that the country would elect him president in the campaign then drawing to a close!

Already the matter had been broached to the Governor. Naturally, he was sorry (*Turn to next page*)

He Showed Thousands the Stars—*Continued*

STELLAFANE, the astronomical club house built by the Telescope Makers of Springfield. This is the scene of many an all-night vigil through a battery of telescopes set on piers in front of the building

to lose the services of so valuable an employee, but he has never stood in the way of advancement of his men. Really, as an astronomer and telescope-maker himself, he wished that he could go along, too!

So early in November Porter set out for Pasadena. When he arrived, he found the work in its preliminary stages. Many parts of the telescope will be made in Pasadena, so before any actual construction can be done, the shops must be prepared. There must be machine shops, equipped with machinery for handling the heavy parts of the instrument, some of which will weigh several tons. There must be optical shops, for grinding the quartz, or glass, if that is finally used, from which the mirrors will be made. The telescope will require more than the single seventeen-foot mirror. Smaller mirrors will be needed to use with it—that is, mirrors that are small compared with the large one, but that are as large as many of the biggest present ones. These mirrors must be tested, so long tunnels must be provided where the temperature and air currents can be closely regulated. The extensive machinery for grinding them to the proper curves must be provided for.

In getting ready for all this activity Porter's talents were found particularly useful. His experience with the Jones and Lamson Company gave him an intimate acquaintance with shop machinery of the largest size. His optical work in the past had given him an insight into the problems of mirror making. As an architect he could aid in the design of the buildings themselves, and as an artist he was able to advise in the more decorative features. For the new buildings will be part of the California Institute of Technology, a group conceived by the late Bertram Grosvenor Goodhue, one of the most famous of modern architects.

Though Porter is now engaged in the greatest project with which he has ever been connected his past achievements alone would entitle him to well-deserved fame.

It was on December 13, 1871, that Russell Williams Porter first saw the light of day from Springfield, the town with which his name is so inseparably connected. The family was of old New England stock, known for its cultural traditions.

The nature of his upbringing is well shown by a childhood incident described by his close friend and associate, Mr. Oscar S. Marshall, in *The Vermonter*.

"Russell Porter is the youngest of five children, and his parents were Swedenborgian in religion, which this Springfield incident will typify. One day his father by the method of elimination, discovered that it was Russell who had marred some window panes by stone-throwing. Handing the lad a few pebbles and withdrawing a few paces, he requested his son to throw the stones at him just as he had at the building. 'Golly! That nearly broke my heart,' says Russell."

His boyhood chums considered him to be rather lazy, says Mr. Marshall, and his rather plump figure caused him to be nicknamed "pursy" or "pussy." But when he got into college, first at Norwich University, then the University of Vermont and finally Massachusetts Institute of Technology, he could no longer be accused of laziness, if, indeed, it had ever been justified. While at "Tech" he won the Beaux Arts prize for the best design in architecture—the most coveted of awards for the embryonic architect.

But despite his talents which promised high fame in architecture, the routine of such a life had no appeal for him. He did design a very pretty little library for his native town, which was built and still stands near the Jones and Lamson works, a monument to his ability in this field. However, exploration called him. With a fellow student he made an all-water trip around Boston, crossing some building lots in the city proper at high tide. Then he felt the urge of the Arctic. Three student excursions to Labrador and Greenland which he organized and directed gave him experience. Then he joined one of Peary's expeditions and later went on others. The Fiala-Ziegler expedition in 1903-1905, in which he was second in command, was the most strenuous. The relief ship failed to make its way to their quarters at the southern end of Franz Josef Land in 1904, so they had to submit to the rigors of a second Arctic winter without adequate supplies.

His services with these expeditions, which took him within the Arctic Circle ten different times, were as varied as could well be imagined. Artist, topographer, surveyor, astronomer and collector of natural history objects—these were some of his duties. Around the walls of his home today are many striking water colors that he painted on these expeditions. Despite their beauty, they were probably painted under the most difficult conditions that an artist ever encountered, for often it was (*Turn to next page*)

Maya Aristocrats Squeezed Skulls

Archæology

By Don Luis Rosado Vega

Señor Vega is director of the Archæological and Historical Museum of Yucatan, located at Merida.

It seems probable that the Mayas who built the great pyramids and temples whose ruins are now the wonder of the world followed the strange, and to us barbarous, custom of artificially deforming the skulls of their children, to give them what was doubtless considered an elegant and pleasing shape. That this art, followed by many primitive peoples and especially frequent among certain Amerind tribes, had its devotees at least among the Maya aristocracy is attested by two well-preserved skulls found in a tomb near Progreso, on the northern coast of Yucatan.

The two skulls showed the same type of deformity. They had had boards bound against top and back in infancy, when the bones were soft, so that the head-form assumed a startling and unnatural length. It is impossible to determine the sex and age of the individuals to whom these skulls belonged, but it is evident that they were mature adults. This is shown especially by the condition of the teeth. It is conjectured that they were men, because musical instruments, including a flute, were found associated with the burials; and musicians were usually men.

It is greatly to be regretted that skeletal material of the ancient Maya is so nearly totally lacking. Almost nothing is known of their burial customs, and most of the few known tombs were plundered before scientists could have access to them. It is to be hoped that new work in the less accessible ruins will uncover burials telling more of how the Maya treated their dead, and at the same time yielding specimens for study by physical anthropologists.

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He Showed Thousands the Stars—*Continued*

necessary to keep his water melted over an alcohol lamp, and to dip his brush in it frequently to prevent it from freezing.

In 1907 he abandoned the Arctic, and settled down to domesticity. He married, and settled at Port Clyde, Maine, his wife's home, where his interest in telescope making began. To make a living, he built cottages for summer visitors, but to gratify his higher tastes, he made lenses and mirrors for telescopes. Though he had never made a telescope mirror before, and at that time there was little published on the subject, he proceeded to work out his own methods, and made some as large as 16 inches.

His *alma mater* called him, and in 1916 he went back to "Tech" to teach architecture. But not for long, for when the United States entered the war, he found his most useful place was in optical work at the Bureau of Standards in Washington. It was here that he first made the acquaintance of Dr. Hale, who was then organizing the National Research Council, an organization of inestimable value in American science.

The war over, he was summoned back to Springfield, by his old friend James Hartness, who was destined, in 1921, to be elected governor of his adopted state of Vermont. As optical associate of the Jones and Lamson Company, Porter contributed a number of useful inventions resulting from his profound knowledge of optics and mechanics. But perhaps of even greater significance was his organization of a group of telescope makers.

Men and women from the plant—some clerical workers, others from the shop, they were. None had ever before had any astronomical or optical experience, but under the Porter guidance all made creditable reflecting telescopes. All felt the thrill which comes of looking into an instrument fashioned with one's own hands, and seeing the rings of Saturn, the moons of Jupiter, the craters of the moon, and other sights never seen by unaided human eyes. It is a wonderful experience to have one's first sight of these objects through a great observatory telescope, but to see them with one's own handiwork, is to give one some idea of the joy of discovery experienced by a Galileo or a Huygens.

In order to get a clear sky, into which their telescopes could be poked at will, the group made several all-night vigils on nearby hills. This led to the establishment of an astronomical club house, high above the town, which they built themselves and called Stellafane—the temple of the stars.

From a local activity, the telescope makers developed into a national movement when Albert G. Ingalls, one of the editors of *Scientific American*, heard about it. Mr. Ingalls was already interested in making telescope mirrors, so he soon found that he and Porter were united in devotion to a common cause. Publicity came for the telescope makers of Springfield, directions for making telescopes were published, and finally a book was issued, with Mr. Ingalls as editor, containing not only Mr. Porter's instructions for making the mirrors, but also all the other material that could be gathered on the subject. This provided the first modern book on telescope making, and led to other groups throughout the country. A group of amateurs in Pasadena, others in New York, some high-school boys in Washington—these were but a few of the telescope clubs that were formed. Telescope making is not a difficult task, but it requires patience, and to the person who is willing to give this time and energy it offers large returns in the pleasure of beholding the results.

Naturally, telescope making centered around Springfield as its capital, and in 1926 its adherents held a convention there. From near and far they came, many bringing telescopes with them, camping out several nights at Stellafane, comparing the merits and performance of their instruments. Every summer since then, a similar convention has been held at the same place under Porter's leadership.

But now the telescope makers at Springfield will have to get along without him for eight months of the year. No longer will his bald head and ever-present stogie be in evidence at Stellafane, except during his return visits in the summer. But other leaders have arisen to carry out his work there while he is engaged in the still greater labor of helping to build the world's greatest telescope. Quite a contrast it is. Instead of making a small mirror by hand, out of simple parts, costing perhaps $10 or $15, his present endeavors are concerned with a project on which millions will be spent, with the finest of mechanical equipment. Wonderful discoveries may be confidently expected with its aid, and this modest man from Springfield may well feel proud of his part. But after all, is not the insight that thousands have been given into the nature of the world around them through his work of nearly as much significance? One wonders.

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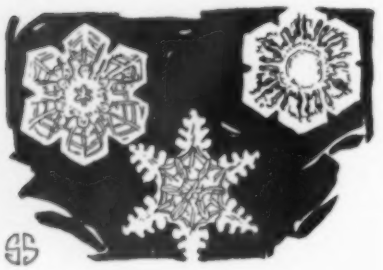
NATURE RAMBLINGS

By FRANK THONE



Snow Crystals

Now is the time when people begin to speculate and wonder whether there is to be a "white Christmas." The fall and early winter have been so uneven—they usually are, so far as that goes—that even if there is snow on the ground today, that is no assurance that it will be here two weeks hence, or even two days hence. It is one of the peculiarities of the part of North America that lies east of the Rockies that settled winter weather cannot be looked for until after Christmas.

But at least light snowfalls may come at any time, and whoever is curious and has a fairly good hand lens can get much enjoyment out of "snow botanizing." For the six-pointed snow stars that sift down in the average storm are among the most beautiful and fascinating of all natural objects. No two of them are ever alike, and some of them form the most intricate and lacy patterns imaginable.

Snow is formed, rather than hail, when the cold breath of the northern wind strikes the vapor-laden air aloft suddenly, and freezes the water into minute ice crystals without giving it a chance to form into drops. An ice crystal nucleus "grows" new slivers of ice, projecting from its various faces, and since the natural shape of ice crystals is hexagonal the resulting snowflake is always a six-pointed star.

Very wet snow, partly melted by falling through a layer of warm air, may aggregate the flakes into shapeless, heavy masses, concealing the original form. On the other hand, a dry snow drifting before a high wind may break up the flakes into the tiny slivers of ice that are their building blocks. It is these minute crystals that are commonest when the snowstorm assumes the force of a blizzard.

For the first time strawberries grown in British Columbia were marketed in England this year.

Ancient tablets recently unearthed in Egypt are the grocery accounts of Egyptian households.

A blind mathematician in London carries on intricate computations by means of Braille numerals and symbols in raised dots and reads with the finger tips.

Once upon a time there was a Busy Person who, discovering that Thanksgiving was past, began to worry and make out a Christmas list. He was in what the novels call a dilemma. So many figurative stockings to fill! And handkerchiefs, neckties, and the doodads of the department stores seemed so trite and futile.

And then the Busy Person, leafing over the pages of his favorite magazine for relief and relaxation, came upon this life-saving suggestion:

"Make a year's subscription to the SCIENCE NEWS-LETTER your standard Christmas gift, a 52 times repeated blessing to the recipient. Notification card will be sent to you or directly to your lucky friend. Science Service as its Christmas gift to you offers a reduced price (good until January 1, 1929 only, as they say in the bargain advertisements) of only $8.00 for *two* gift subscriptions, $12.00 for *three* gift subscriptions, etc."

Realizing that this was the happy solution of his difficulty and that he would actually save money, the Busy Person jotted down the names and addresses in a space like this:

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He wrote out his check, mailed it and the list to Science Service, 21st and B Sts., Washington, D. C., and stopped worrying until next December 1.

P. S.—You are invited to do likewise. In spite of the beginning, this is *not* a fairy story.

Jupiter Shines High in December Sky

Astronomy

December: Orion shining magnificently in the eastern evening sky! This is apt to be the association of ideas in the mind of the student of the stars. Last April this finest of all constellations vanished in the west, now it has returned to presage the coming of a new year.

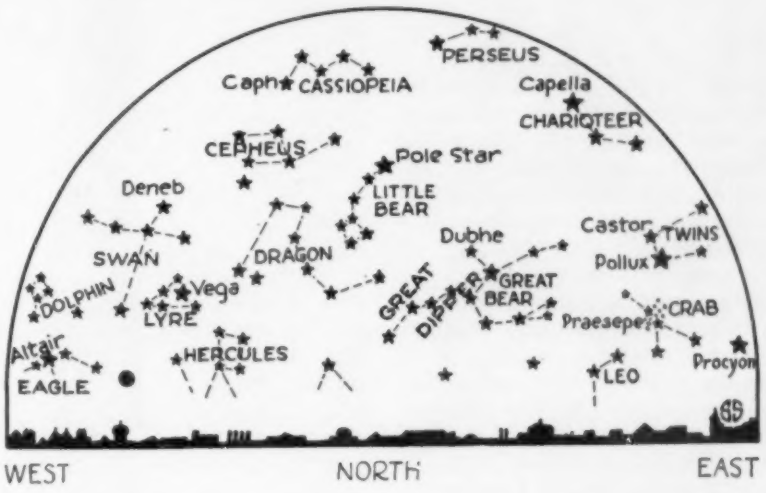
Next to the great dipper, probably no other group of stars is so familiar as Orion. The three stars in a row, now standing nearly upright, form the so-called "belt". Toward the south is Rigel, while to the north is Betelgeuse. Betelgeuse is especially interesting because it was the first star to have its diameter measured by means of the interferometer. This was an invention of Prof. A. A. Michelson, and was applied to the stars on the great 100-inch telescope at the Mt. Wilson Observatory by F. G. Pease. With its aid he found that the star is about two hundred million miles in diameter. As a matter of fact, its diameter changes. Sometimes it is as small as one hundred eighty-five million miles, while at other times it expands to two hundred fifty-six million miles. These figures represent two hundred fourteen and two hundred ninety-six times the diameter of the sun.

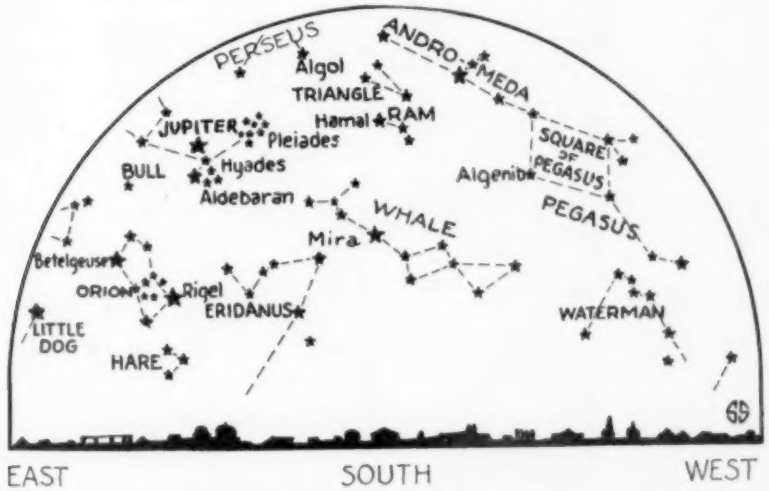
Above the belt of Orion is Bellatrix. The belt refers to the belt of the gigantic warrior with which the ancients identified this group of stars. Orion was a mighty warrior, and was represented on the old star maps as a man holding a club in one hand and a lion skin over the other arm. Betelgeuse represents one shoulder, Bellatrix the other. He is about to smite the heavenly bull, Taurus, which is represented by the constellation now above Orion. The red star of Aldebaran, in this group, represents the eye of the bull, watching Orion. The constellation of Taurus is further decorated this month by the presence of one of the planets; in fact, the largest of the planets, Jupiter. It is near Aldebaran, a little above it and to the left. As it shines with a steadier light than the stars, however, there is no doubt as to which is star and which is planet.

With the aid of even a small telescope, Jupiter becomes a very interesting object, because of its four conspicuous moons. These were the first astronomical objects ever discovered with a telescope. In the year 1610, when Galileo, in Florence, heard of the invention of a device in Holland that would make distant objects appear close, he at once recognized its astronomical possibilities. Without receiving any details of the construction of the device, and solely on his own knowledge of optics, he proceeded to construct one. This little instrument was hardly as good as a modern pair of opera glasses, yet with it he made some of the most important of all discoveries. It was in January that he completed it, and as Jupiter then, as now, happened to be conspicuous it was the first thing he looked at. To his surprise he found that the planet was not alone, but attended on either side by smaller points of light.

Like the good astronomer that he was, he soon got over his surprise, and made a drawing of what he saw. The next night he looked again and found that the additional "stars" had moved. Night after night he watched them, and every night he saw them in a different position. Occasionally one of them would disappear, only to reappear a day later.

These are the four largest of Jupiter's moons. Unlike the earth, which has only one satellite, or Venus, which has none, Jupiter has nine satellites. As they revolve around the planet, they sometimes pass in front of it and sometimes behind it, when they are not visible, even to a telescope. These four largest moons are all just a little below the limit of naked-eye visibility. In fact, claims have been made by persons of exceptionally keen sight that they have seen them with the unaided eye. It is not likely that this is the case, but it is possible that occasionally (*Turn to next page*)





HOLD THESE MAPS in front of you and face North or South. The upper or lower one will then show the stars of the December evening sky

December Sky—*Continued*

two or more of them might be so close together that they would appear as one object of a brightness equal to their sum. Then they might be seen by persons of keen sight.

For over two and one-half centuries after Galileo's discovery, no more moons were discovered. Then the great refracting telescope at the Lick Observatory in California, with its yard-wide lens, was completed. One of the most skillful astronomers to use this instrument was the late Edward E. Barnard, a former Nashville photographer, who took up astronomy in an amateur way but became one of the greatest in his field before he died a few years ago. On the night of September 9, in 1892, Prof. Barnard looked at Jupiter with this huge instrument, then the largest in the world. He saw the planet, as well as the four moons that Galileo had discovered so long before. But he saw something else. Instead of four, there were five points of light. At first, he probably thought that it was merely a star that happened to be in the same direction. Then he measured its distance from the planet and looked again a few hours later. If it were a star, the motion of the planet would have left it behind, but a satellite would go along with the rest of the system. Sure enough, it had moved with Jupiter, and so was without question a fifth satellite. Thus Barnard had joined the exclusive group of satellite discoverers which Galileo had founded.

The next few years brought no further satellite discoveries, until December, 1904, when Dr. C. D. Perrine, another Lick Observatory astronomer, made a photograph of the planet with the large reflecting telescope. On this plate a sixth moon turned up. He continued his observations, and the next month,, January, 1905, fished still a seventh Jovian satellite out of the obscurity in which it had moved for countless ages.

In January, 1908, an English astronomer, P. J. Melotte, also by photography, discovered the eighth. However, the Lick Observatory was destined to score again, because in July, 1914, a young astronomer there, Dr. Seth B. Nicholson, with the same reflecting telescope, tried to make a photograph of the eighth satellites. To his surprise, the photograph showed not only the eighth but still another one, which was number nine. No others have been found since, though it is likely that there are several more tiny bodies circulating around the planet which will be picked up as astronomical observing methods are improved. When the 200-inch reflecting telescope, now being constructed for the California Institute of Technology is completed, satellites number ten, eleven, and twelve may be found.

Our own single moon, of course, is with us this month as usual. But it does two things of interest that would repay watching. As it moves through the sky it frequently comes in front of stars. Usually these are faint, but occasionally one bright enough to be seen by the naked eye is thus occulted. Two occultations of naked-eye stars occur this month. Neither is very bright, however, and a pair of opera glasses, or field glasses, would help greatly in watching the phenomena.

On December 14, a star in Taurus, known as alpha Tauri, is hidden behind the moon at twenty minutes after six, Eastern Standard Time. About an hour later, at 7:22, it emerges on the other side. As the moon moves across the sky from west to east, the star disappears on the eastern edge and reappears on the western edge of the moon. The moon is not quite full on the 14th, however, so we cannot see the eastern limb. Consequently, the star will seem to disappear a short time before it reaches the illuminated surface.

The second occultation occurs on the 24th of the month, or the day before Christmas. This star is theta Virginis in the constellation of Virgo. This occultation occurs at a less convenient time, for it happens in the early morning hours.

Altogether, nine first magnitude stars are visible in the December evening sky. Betelgeuse, Rigel, and Aldebaran have already been mentioned. Low in the southeast, below the belt of Orion, is the most brilliant of all the stars we can see, Sirius, the dog star. This is in Canis Major, the greater dog. Over in the east is another bright star, which is Procyon in Canis Minor, the lesser dog. Higher in the east is the brilliant Capella in Auriga, the charioteer.

Between Procyon and Capella, and a little to the north, are two bright stars, one above the other. These are the twins, Gemini. The lower one is the first magnitude star, Pollux; the upper one is Castor.

Lower in the northwest, now nearly out of view, is Lyra, with the bright star Vega. Somewhat above it is Cygnus, the swan, with the bright Deneb.

Submarine Landslides Break Cables

Seismology

Under-sea landslides, set in motion by the earthquake on Monday, Nov. 18, were the cause of the breaks in trans-Atlantic cables at that time, in the opinion of Commander N. H. Heck, in charge of the U. S. Coast and Geodetic Survey's investigations in seismology.

With the aid of data gathered from seismograph stations by Science Service, Commander Heck and his associates determined the approximate center of the earthquake at 10 p. m. on Monday, less than seven hours after the quake had occurred.

The widespread area over which this quake was felt, the serious tidal waves that were caused and the breaks of the cables, all show that it was one of the most severe ever experienced in the eastern part of North America, he stated. Evidently it was very deep-seated under the ocean bed. Thus, instead of having a small, well defined center, it seems to have centered over a large area.

In this part of the ocean, just off the edge of the continental shelf, the ocean bottom has a steep slope, and so the shake doubtless caused submarine landslides which broke the cables. The origin, off the coast of Newfoundland, was well to the north of most of the breaks, at approximately 44 degrees north latitude and 58 degrees west longitude. This point is about 180 miles off the Newfoundland coast.

The vibrations of the shock, traveling through the earth to the sensitive seismograph instruments at a number of observatories, carried the news to the world many hours before the telegraph lines carried news of its effects. Using a special code, several of the most important of these stations telegraphed their data to Science Service. Commander Heck was able to tell the distance of the center from each of the stations reporting. Correlating these, he determined the approximate position of the quake's center which was announced through Science Service at 10:30 p. m. the same day.

A quake such as this is very difficult to locate accurately, he said, because of its large area. The vibrations which arrive at different observatories may come from different parts of the shaken area. Then it would be quite impossible to fit them all together.

Commander Heck estimates that the tremor was severe enough to be felt as a strong shock over an area of 200,000 square miles, mostly at sea. Over a still larger area, about 1,500,000 square miles, the earth quivered sufficiently to cause a perceptible shaking on land. A shock must be quite strong to be perceptible to a ship.

A quake in this region is quite unprecedented, he said, and shows that any part of the earth is liable to such shocks. However, there is no evidence that any further shocks will occur in the same locality.

Science News-Letter, December 7, 1929

Tells How to Fight Blindness

Ophthalmology

"Eyes have been preserved by people not infecting them," Dr. Park Lewis, vice-president of the National Society for the Prevention of Blindness, declared in the first 1929 De LaMar lecture at the Johns Hopkins School of Hygiene and Public Health.

Prevention of blindness is made up of negations, Dr. Lewis said. He traced the sight-saving movement from its beginning fifty years ago, when a means for preventing ophthalmia neonatorum, or babies' sore eyes, was found. This disease was and still is a big cause of preventable blindness.

The first adventurer in sight-saving was Dr. Karl Siegmund Franz Credé of the University of Leipsig, Dr. Lewis said. Dr. Credé found that the application of silver nitrate to the eyes of babies shortly after birth prevented the development of the dread babies' sore eyes and ensuing blindness. Dr. Credé started using this preparation in May, 1880. During the first five months of that year nearly one-tenth (7.6 per cent.) of the babies born in his hospital had developed ophthalmia neonatorum. In all the births during the remaining seven months of the year, when the silver nitrate treatment was being followed, there were no infections.

Ophthalmia neonatorum is now absolutely preventable and has been for 50 years. The infection may even be cured, if treatment is started before the disease has progressed too far. In spite of this, progress has been slow and even today many children lose their sight because of this entirely preventable disease, Dr. Lewis said. Ignorance or carelessness on the part of the attendant at the birth of the child is responsible for this deplorable condition. However, with state boards of health everywhere furnishing the preventive medicine free, even the poorest parents may insist on having their new-born babies protected from this cause of blindness.

Other adventurers in sight-saving mentioned by Dr. Lewis were two English physicians, Drs. M. Roth and R. E. Dudgeon, who with a few colleagues formed the London Society for the Prevention of Blindness over forty years ago; Dr. Ernst Fuchs, whom Dr. Lewis called dean of ophthalmologists; Mrs. Winifred Holt Mather who founded the Lighthouse movement, and her sister, Mrs. Joseph C. Bloodgood; Miss Louisa Lee Schuyler who established the New York Society for the Prevention of Blindness which has now become the National Society; and Dr. Lucien Howe who presented the cause of blindness prevention with telling results before legislatures and medical societies throughout the country.

Trachoma is another cause of a large amount of preventable blindness, Dr. Lewis said, and described the work that has been done among immigrants and more recently among the Indians and the mountaineers of Kentucky and Tennessee. This "creeping menace" is an infectious granulation of the lining membrane of the eyelids. It may be relieved by treatment, which, while slow and painful, is well worth while, as blindness is the end result to untreated trachoma. The Japanese investigator, Dr. Hideyo Noguchi, thought he had found the organism causing this disease, but his studies were interrupted by his untimely death. Whatever the causative agent, trachoma may be prevented and may also be overcome if attacked early enough.

International cooperation to prevent blindness is the latest adventure in sight-saving and may be expected to foster further and even greater progress in this field.

"The world is awakening to the necessity fo saving the eyesight of its people," Dr. Lewis declared.

Science News-Letter, December 7, 1929

Sweeter Than Sugar

Chemistry

A new sweetening compound which is somewhat sweeter than saccharine and 690 times sweeter than sugar has been prepared by Dr. Henry Gilman and J. B. Dickey of the department of organic chemistry at Iowa State College from waste products of corn. The name of this compound is "the *syn*-isomer of 5-benzyl-2-furfuraldoxine."

Despite its sparing solubility in water it may become a pattern for new and valuable sweetening compounds. As yet, no study has been made of its physiological action. It is interesting to note that unlike other artificial compounds of high sweetening power this compound can be readily prepared from sugar by standard organic reactions. Other raw materials, like paper and cellulosic compounds in general, can be used as a starting point in its synthesis.

Previously, Dr. Gilman and A. P. Hewlett prepared a compound from corn cobs which was 200 times sweeter than sugar.

Science News-Letter, December 7, 1929

Bones Grown in Tubes

Histology

A most amazing case of living tissue being grown outside the animal body is the growth of embryo gristle or cartilage into bone. This remarkable transformation has been accomplished by Miss Honor B. Fell, working at the Strangeways Research Laboratory at Cambridge, England.

When the proper conditions of nourishment and temperature are maintained, isolated cells from animal embryos have been seen to grow and develop in the test tube just as if they were still in the animal body. Miss Fell, using a technic similar to one devised by the late Mr. Strangeways, has thus cultivated tiny pieces of gristle from six-day old embryos of fowl. During cultivation, they increased to more than three times their original length and developed along practically normal lines.

Besides growing, these test tube cultivations have actually manufactured a substance called phosphatase, an enzyme, which is of immense interest to biochemists, Miss Fell and R. Robison of the Lister Institute, London, have reported. When the tiny pieces of gristle were taken from the embryo, they contained no phosphatase at all.

Science News-Letter, December 7, 1929

Silver from Waste

Chemistry

How one of the large Hollywood motion picture laboratories has turned its tanks of old developing solutions into a silver mine yielding $6,000 a month is told by the Bureau of Standards. The emulsion on undeveloped film consists largely of silver, associated with bromine to form silver bromide. When developed, the silver bromide that has been exposed to light changes to metallic silver. In the fixing bath, the unchanged silver bromide is dissolved out, leaving clear spaces where the film was in darkness. Every pound of silver bromide contains over nine ounces of silver. Though miles of film are run through the solutions weekly, and they contain large quantities of silver, they were formerly thrown into the sewer when their power was exhausted. Now, by a simple chemical process, the silver is recovered, and sold to the U. S. Mint at San Francisco. Old film is also burned to recover the silver, and sometimes yields as much as $1,000 worth of silver a month in addition.

Science News-Letter, December 7, 1929

CLASSICS OF SCIENCE: Earliest Description of Potatoes

Botany

If you are curious about how the English first used the potato, try these recipes. It is interesting to learn that the sweet potato was well-known in Gerard's time and called the "common" kind while the white potato was a comparative rarity.

THE HERBALL or Generall Historie of Plantes. Gathered by John Gerarde of London Master of Chirurgerie. Imprinted at London by Iohn Norton, 1597.

Potatoes. Chap. 334

Sisarum Periuuianum, siue Batata Hispanorum. Potatus or Potatoes.

* *The description*

This plant which is called of some *Sisarum Periuuianum,* or Skyrrits of Peru, is generally of vs called Potatus or Potatoes. It hath long rough flexible branches trailing vpon the ground, like vnto Pompions; whereupon are set rough hairie leaues, very like vnto those of the wilde Cucumber. There is not any that hath written of this plant, or saide any thing of the flowers, therefore I refer the description thereto vnto those that shall heereafter haue further knowledge of the same; yet haue I had in my garden diuers roots that haue florished vnto the first approch of winter, & haue growen vnto a great length of branches, but they brought not foorth any flowers at all; whether bicause the winter caused them to perish before their time of flowering, or that they be of nature barren of flowers, I am not certaine. The rootes are many, thicke, and knobbie, like vnto the rootes of Peionies, or rather of the white Asphodill, ioned togither at the top into one head, in manner of the Skyrrit, which being diuided into diuers parts and planted, do make a great increase, especially if the greatest rootes be cut into diuers gobbets, and planted in good and fertill ground.

* *The place*

The Potatoes grow in India, Barbarie, Spaine, and other hotte regions, of which I planted diuers rootes (that I bought at the exchange in London) in my garden, where they flourished vntill winter, at which time they perished and rotted.

* *The time*

It flourished vnto the end of September: at a first approch of great frosts, the leaues togither with the rootes and stalkes do perish.

* *The names*

Clusius calleth it *Batatta, Camotes, Amotes,* and *Ignanes*: in English Potatoes, Potatus, and Potades.

JOHN GERARD

* *The nature*

The leaues of Potatoes are hot and drie, as may euidently appeere by the taste. The rootes are of a temperate qualitie.

* *The vertues*

A The Potatoe rootes are among the Spaniards, Italians, Indians, and many other nations common and ordinarie meate, which no doubt are of mightie nourishing parts, and do strengthen and comfort nature, whose nutriment is as it were a meane betweene flesh and fruit, though somewhat windie; but being rosted in the embers, they do lose much of their windinesse, especially being eaten sopped in wine.

B Of these rootes may be made conserues, no lesse toothsome, wholesome, and daintie, than of the flesh of Quinces. And likewise these comfortable and delicate meates, called in shops *Morselli, Placentulae* and diuers other suchlike.

C These rootes may serue as a ground or foundation, whereon the cunning confectioner or Sugar baker may worke and frame many comfortable delicate conserues, and restoratiue sweete meates.

They are vsed to be eaten rosted in the ashes; some when they be so rosted, infuse them, and sop them in wine: and others to giue them the greater grace in eating, do boile them with prunes, and so eate them. And likewise others dresse them (being first rosted) with oile, vinegar and salt, euery man according to his owne taste and liking: notwithstanding howsoeuer they be dressed, they comfort, nourish, and strengthen the bodie, procure bodily lust, and that with greedinesse.

Of Potatoes of Virginia. Chap. 335

Battata Virginiana siue Virginianorum, & *Pappus.* Potatoes of Virginia.

* *The description*

Virginia Potatoes hath many hollow flexible branches, trailing vppon the grounde, three square, vneuen, knotted or kneed in sundry places at certaine distances; from the which knots commeth foorth one great leafe made of diuers leaues, some smaller, & others greater, set togither vpon a fat middle rib by couples; of a swart greene colour tending to redness. The whole leafe resembling those of the Parsnep, in taste at the first like grasse, but afterward sharp & nipping the toong: from the bosome of which leaues come foorth long rounde slender footstalks, whereon do grow very faire and pleasant flowers, made of one entire whole leafe, which is folded or plaited in such strange sort, that it seemeth to be a flower made of sixe sundrie small leaues, which cannot easily be perceiued, except the same be pulled open. The colour whereof it is hard to expresse. The whole flower is of a light purple color, stripped down the middle of euery folde or welt, with a light shew of yellownes, as though purple and yellow were mixed togither: in the middle of the flower thrusteth foorth a thicke fat pointell, yellow as golde, with a small sharpe greene pricke or point in the middest thereof. The fruite succeedeth the flowers, round as a ball, of the bignes of a little bullesse or wilde Plum, greene at the first, and blacke when it is ripe; wherein is contained small white seede, lesser than those of Mustarde. The roote is thicke, fat, and tuberous; not much differing either in shape, colour or taste from the common Potatoes, saving that the rootes hereof are not so great nor long; some of them round as a ball, some ouall or egge fashion, some longer, and others shorter: which knobbie rootes are fastened vnto the stalkes with an infinite number of threddie strings.

* *The place*

It groweth naturally in America where it was first discouered, as reporteth *C. Clusius,* since which time I have receiued rootes hereof from Virginia, otherwise called Norembega, which growe and prosper in my garden, as (*Turn to next page*)

Potatoes—*Continued*

in their owne natiue countrie.

* *The time*

The leaues thrust foorth of the grounde in the beginning of May; the flowers bud foorth in August. The fruit is ripe in September.

* *The names*

The Indians do call this plant *Papus* (meaning the rootes) by which name also the common Potatoes are called in those Indian countries. We haue the name proper vnto it, mentioned in the title. Bicause it hath not onely the shape and proportion of Potatoes, but also the pleasant taste and vertues of the same, we may call it in English Potatoes of America, or Virginia.

* *The temperature and vertues*

The temperature & vertues are referred vnto the common Potatoe; being likewise a foode, as also a meate for pleasure, equall in goodness & wholesomnesse vnto the same, being either rosted in the embers, or boiled & eaten with oile, vinegar & pepper, or dressed any other way by the hand of some cunning in cookerie.

John Gerard (1545-1612) practiced his profession of surgery, and carried on gardening as a super-hobby at the same time. At the age of 50 he was elected a member of the famous court of barber-surgeons. The next year he published a catalog of the more than a thousand plants in his London garden. This was followed by the Herball, which aimed at listing all the known plants. Some of the material in it was borrowed from similar Continental books, but the Herball seems to have been a unique and much-needed work in the English language.

Science News-Letter, December 7, 1929

Physics Instrument Finds Cable Break

Physics

Cable repair ships now on their way to the region south of Newfoundland to remedy the damage done by the recent earthquake will be able to cruise directly to the point of the breaks. An instrument used in a laboratory experiment in elementary physics courses permits the location of a cable break from the land to within half a mile, no matter whether the break is near shore or in the middle of the ocean.

This instrument is called the Wheatstone bridge, after its inventor, Sir Charles Wheatstone, British physicist and one of the pioneers in telegraphy. It is used to measure the resistance of a wire to the flow of electricity. This is done by connecting the unknown circuit and one whose resistance is known to a galvanometer, a sensitive current measuring instrument. The connection is so made that no current flows through the galvanometer when the two resistances are equal, and then the needle of the instrument points to zero.

When a cable breaks, the copper conducting wire is exposed to the ocean water, and so there is an electrical circuit from the land end through the cable to the break and back through the salt water. By means of a Wheatstone bridge, the resistance of this circuit is measured. The resistance of the water is high, but it is practically the same for short and long distances. But the longer the cable the greater the resistance of the cable, so that the higher the resistance, the farther the break is from land. As the resistance for any length of cable is accurately known, the distance of the break can easily be determined to within half a mile. The path of the cable is known, so when that distance is laid off, the place of the break is located.

When the repair ship reaches the point of the break there is still work ahead. First the crew must grapple for the cable, but it is not necessary to pull the broken end to the surface. In deep water, or when the end is caught, a special grapnel is used which cuts off the broken end and grasps the remainder. This is lifted to the surface, tested to see if the connection is clear to the shore, and then fastened to a buoy so that it may be located again. Then the ship cruises to the other side of the break and picks up the other end of the cable.

A new piece of cable is then spliced on to this end, and the ship returns to the other end, as marked by the buoy, paying out the new cable as it goes. This end is then spliced to the new piece of cable, the cable dropped over, and the complete cable connection is then restored. In deep water the new piece spliced in is sometimes as long as ten or twelve miles. The water is not very deep off Newfoundland, however, and much shorter lengths will suffice. By allowing plenty of slack in the new piece in making it longer than the parts of the original cable that were cut off, the probability of a future break in the same place is lessened.

Science News-Letter, December 7, 1929

Meteorite May Carry Cosmic Secrets

Astronomy-Geology

One of the oldest things on the earth, a small stone that started wandering through space some ten thousand million years ago, according to the estimates of astronomers, perhaps before the earth itself was formed, was exhibited in New York by Dr. Harlow Shapley, director of the Harvard College Observatory. Dr. Shapley gave the second in a series of five lectures at the College of the City of New York.

The stone is a meteorite—one of a shower of "shooting stars" that traveled at a speed of 35 miles a second, and caught up with the earth, itself speeding along at 20 miles a second, in 1867. Though most of the members of this shower were completely burned by the friction with the earth's atmosphere, this one landed in Poland, and was finally brought to the attention of scientists.

The speed of the meteorite shows that it was moving in a "hyperbola". This proves that it came into the solar system from outer space, and, according to Dr. Shapley, such meteoric stones carry with them the story of the nature of the material universe in the times before the earth and other planets were formed.

In Dr. Shapley's first lecture, given recently, he outlined a classification of material systems from the smallest constituents of the atoms of matter to the universe itself. His second lecture was devoted to the subclassification that he calls the Microcosmos, which includes everything from the electrons to the meteorites.

He particularly emphasized the importance of meteorites in revealing knowledge of the outside universe.

"Our contact with the outside universe comes only through two media—light and meteors," he said. "The meteors that filter down through the atmosphere as meteorites provide opportunities for significant chemical analyses. It is estimated that a thousand million meteoric particles collide with the earth's atmosphere every twenty-four hours, and all but the largest and slowest are burned in the atmosphere.

"Prolonged studies of the numbers and motions of meteors (shooting stars) will contribute a test of theories of the origin of the earth, especially of the planetesimal hypothesis. The planetesimals are one class of meteors.

"There is a close connection between the clouds of meteors moving across the solar system and the great diffuse nebulae of the Milky Way. The nebulae are believed to be factors in the evolution of stars, and therefore studies of meteors will help to interpret the nature of the nebulae and their role in the evolution of stars and planets.

"Studies of the brightness of shooting stars indicate that the earth's atmosphere fifty miles above the surface is of about the same temperature as at the surface itself. Further knowledge of the upper atmosphere will come through theoretical studies and observations of the brightness of meteors."

Science News-Letter, December 7, 1929

Bison in Alaska

Animal Husbandry

Bison herding may yet come to rival reindeer raising, the newest of Alaska's great industries, if the preliminary experiments reported by L. J. Palmer of the U. S. Biological Survey prove successful enough to justify their extension on a larger scale.

About a year and a half ago, Mr. Palmer states, 23 head of bison were shipped to the northern territory from the National Bison Range, Montana. Nine were released near the town of McCarty, and four held at the reindeer experiment station at Fairbanks. The animals came through their first winter in good shape, in spite of heavy snows, feeding on natural fodder, chiefly the wild vetch.

Science News-Letter, December 7, 1929

FIRST GLANCES AT NEW BOOKS

THE FOUNDATIONS OF EXPERIMENTAL PSYCHOLOGY—Edited by Carl Murchison—*Clark University Press* ($6). The problems which, it has been concluded, psychology may profitably attack from the experimental angle are discussed in twenty-three chapters, each by a well known experimentalist. The range of the problems spreads over the borderlines of the various sciences allied to psychology, and so we have a chapter on hunger and thirst by Cannon, the mechanism and laws of heredity by Morgan, the conflict and survival of cultures by Wissler, the abnormal individual by Franz, as well as chapters on senses and emotions and abilities. The editor states: "It is our intention that this book shall appear in new editions frequently enough to be always abreast of progress. This will mean a revision almost every year."

Psychology
Science News-Letter, December 7, 1929

DANGER SPOTS IN WORLD POPULATION—Warren S. Thompson—*Knopf* ($3.50). Constantly haunted by a Malthusian specter, the world has staggered along from war to war for many generations. Between wars, it has wavered between palliatives and platitudes in the pious hope of promoting peace, and insolences and racial superiority complexes born of the fear of crowding neighbors. The specter has not yet been laid, and until it is looked in the face with the cool inquisitiveness of science it is not likely to be laid. The value of Prof. Thompson's book lies in its serious effort to reach dispassionate objectivity, through all the din of noisy jingoes and even more vociferous pacifists.

Sociology
Science News-Letter, December 7, 1929

SOCIOLOGY AND SIN—P. Sargant Florence—*Norton* ($1). Expounds logically the weak points in the present moralistic attitude toward social progress and advocates a scientific method in the social sciences.

Sociology
Science News-Letter, December 7, 1929

CRIMINOLOGY—Horace Wyndham—*Jonathan Cape and Harrison Smith* ($1.50). A prominent English writer discusses in a small and readable volume a big problem. One of his conclusions is: "The death penalty fails utterly in its purpose. It does not stop murders."

Criminology
Science News-Letter, December 7, 1929

THE POLICE AND THE CRIME PROBLEM—Thorsten Sellin—*American Academy of Political and Social Science* ($2). This volume, published as part of the Annals of the American Academy of Political Science, contains a wealth of material on police organization and administration, and the tools and the technique of criminal investigation. It represents the work of twenty-seven experts in the field. According to the editor, the volume has as its primary purpose to "give a wide circle of intelligent readers a conception of the problems which face the police and of the handicaps which the latter must face in solving them."

Criminology
Science News-Letter, December 7, 1929

THE EXPERT—Oscar C. Mueller—*Saturday Night Publishing Co.* ($1.50). An interesting and entertaining little volume pleading for the adoption of a statute throughout America to regulate expert testimony. The author quotes many legal opinions to the effect that "experts" should be provided by the court, not hired by counsel.

Sociology
Science News-Letter, December 7, 1929

INCOMES AND LIVING COSTS OF A UNIVERSITY FACULTY — Edited by Yandell Henderson and Maurice R. Davie—*Yale University Press* ($2). Can a professor afford a car? How much should he pay? Can an assistant professor afford a baby? How many? These and other questions highly pertinent to the physical and mental comfort of faculty members, which must be answered if American colleges and universities are to continue to function, are here discussed fully and dispassionately. The book is a necessity for presidents, deans, trustees, regents and all others whose job it is to see "that the faculty are well fed." It will be worth a perusal also by candidates for graduate degrees.

Economics
Science News-Letter, December 7, 1929

FRANKLIN—Bernard Fay—*Little, Brown* ($3). Those whose interest in Franklin has centered upon his scientific work, will find this extensive biography profitable and entertaining recreational reading. It is based on original material and written by a Frenchman who has served both French and American colleges as professor.

Biography
Science News-Letter, December 7, 1929

DUST TO LIFE—B. T. Thom—*Dutton* ($5). This book presents in clear, readable, straightforward fashion the main outlines of the story of cosmogenesis and evolution, giving especial emphasis to the story of the dinosaurs and the development of the mammals. Some of the author's statements, however, are a trifle broad: e.g., his declaration that a dinosaur took to the trees and became a mammal. He also describes and illustrates some of the early hominoid primates, especially *Pithecanthropus* and *Eoanthropos,* with rather more confidence than present data would justify.

Evolution
Science News-Letter, December 7, 1929

A REVISION OF THE GENUS GORILLA—H. J. Coolidge, Jr.—*Harvard Mus. Comp. Zool.* ($5). After a thorough review of the literature and a painstaking examination of much skeletal material, Mr. Coolidge's verdict is that the genus is monotypic, the one species being *G. gorilla,* with two distinct varieties, *gorilla,* of the coastal region, and *beringei,* of the interior mountains.

Zoology
Science News-Letter, December 7, 1929

TRUE NATURE STORIES—A. E. Verrill—*Badger* ($2). A book of animal lore, from mammals down to fishes, for boy scouts and other boys.

Zoology
Science News-Letter, December 7, 1929

MY TROPICAL AIR CASTLE—Frank M. Chapman—*Appleton* ($5). Dr. Chapman writes with vividness and charm, as he well knows how, about the birds and beasts that have been penned up by the waters of Gatun lake on that new paradise of naturalists, Barro Colorado island.

Zoology
Science News-Letter, December 7, 1929

THE LIFE OF THE CELL—D. L. Thomson—*Holt* ($1.25). This newest volume of the Home University Library gives in brief compass an up-to-date presentation of cytology, stressing the dynamics of cell chemistry and cell life history.

Cytology
Science News-Letter, December 7, 1929

ELEMENTS OF GEOLOGY—W. H. Norton—*Ginn* ($2.20). A new edition of a text which has already passed through two successful printings.

Geology
Science News-Letter, December 7, 1929